International Journal of Agricultural
Science and Research (IJASR)
ISSN(P): 2250-0057; ISSN(E): 2321-0087
Vol. 5, Issue 1, Feb 2015, 19-22

STUDY ON GENETIC VARIABILITY IN GROUNDNUT (*Arachis hypogaea* L.) GERMPLASM

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ABSTRACT

The 50 genotypes of groundnut were planted in randomized block design with K-6 as a check, were studied. The analysis of variance was significant for all characters days to 50% flowering, plant height (cm), number of branches per plant, days to maturity, number of pods per plant, number of grain per pod (g), seed index (100 seed weight), pod yield per plant (g), sound matured kernel (%) and shelling (%). Based on the mean performance among 50 genotypes, ICG-10185 followed by ICG-10092 were found to the best genotypes for pod yield per plant indicating the presence of amount of variation for these characters and indicating these traits could be used for selection for crop improvement. High heritability was observed for plant height (99%), seed index (94%) and pod yield/ plant (83%). High value of genetic advance was observed for plant height (21.92), while moderate value of genetic advance was observed for seed index (18.07), followed by shelling (%) (12.67).

KEYWORDS: Genotypes, Groundnut, Heritability, Genetic Advance and Variation

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is an important oilseed crop of tropical and subtropical regions of the world. It is the World's thirteenth most important food crop, the fourth most important source of edible oil and the third most important source of vegetable protein (**Encyclopedia of Agricultural Science**). It is a primary source of edible oil and has a high oil content (44 -50 percent) and protein content (25 percent). Groundnut oil contains 46 and 32 percent of mono unsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA), respectively. India is largest grower and second producer after China, the average area (4.19 million ha), production (5.62 million ton.) and productivity (1341 kg/ha**)** (**Annual Reports of Groundnut Research Institute, Junagarh 2011-12**). Variability in genotypes for yield and contributing traits form the basic factor while making selection. The presence and magnitude of genetic variability is in a gene pool is the pre-requisite of a breeding programmed (**Tiwari *et al,* 2011**). Heritability of a trait is important in determining its response to selection. It was found out earlier that genetic improvement of plants for quantitative traits requires reliable estimate of heritability in order to plan an efficient breeding programme. The broad sense of heritability is the relative magnitude of genotypic and phenotypic variance for the traits and it given an idea of the total variation accounted to genotypic effect (**Allard 1960**). Genetic advance further provides information on expected generation gain resulting from selection of superior individuals. Grain yield is a complex polygenic character controlled by many genes interacting with the environment and is the product of many factors called yield components. Selection of superior parents exhibiting better heritability and genetic advance for various characters is an essential prerequisite for any yield

improvement programme (Khan *et al*, 2008).

MATERIAL AND METHODS

The present investigation was carried out during *Kharif* -2013 at the Crop Research Centre of Allahabad school of Agriculture SHIATS Deemed-to-be University, Allahabad (U.P.). This research centre is located in the sub-tropical region, North Plane Zone with 25.87^0N latitude and 81.50^0E longitude and 78 m altitude. Experimental material consisted of fifty groundnut genotypes were sown in randomized block design with three replication. Row to row and plant to plant distance was maintained at 40 and 10cm, respectively. The crop was grown under normal condition. Five selected plants were used to take the data from each plot of each replication. Data were recorded for days to 50% flowering, plant height, number of primary branches per plant, days to maturity, number of pods per plant, Number of grains per pod, seed index (100-seed weight), Shelling percentage, Sound matured kernel percentage and pod yield per plant from individual tagged plant. The mean of different characters were calculated on the basis of these individual data recorded for each character in each replication and subjected for analysis of variance (**Fisher, 1936**), coefficient of variation (**Burton *et al*,1952**), heritability (**Burton and Devane, 1953**), genetic advance (**Johnson *et al*, 1955**).

RESULTS AND DICUSSIONS

The mean squares of various traits indicated that there were significant differences among genotypes for all the characters namely days to 50% flowering, plant height, primary branches per plant, days to maturity, pods per plant, grains per pod, seed index, shelling %, sound matured kernel (%) and pod yield per plant are presented under study presented in **Table 1**. Based on the mean performance of 50 genotypes, ICG-10185 (26.90) followed by ICG-10092 (26.78) were found to be best genotypes for pod yield per plant.

The data on estimates of genotypic coefficient of variation (GCV), phenotypic coefficient of variation (PCV), heritability and genetic advance are presented in **Table 2**. The estimates of phenotypic coefficient of variation (PCV) were slightly higher than those of genotypic coefficient of variation (GCV) for all the traits studied. In this study slight differences indicated minimum environmental influence and consequently greater role of factors on the expression of the traits. Genotypic coefficient of variation and phenotypic coefficient of variation was highest for pod yield per plant followed by plant height and seed index. Similar results were obtained by **Naazar *et al*, (2000)**, **Kumar and Rajamani, (2004)**, **John *et al*, (2005)**, **Khote *et al*, (2009)** and **Shinde *et al*, (2010)**.

Heritability plays an important role in deciding the suitability and strategy for selection of a character. In the present study high heritability was observed for traits viz. plant height (99.00%) followed by seed index (94.00 %), pod yield per plant (83.00%), shelling (%) (82.00%), days to 50% flowering (79.00%) and pods per plant (64.00%). Similar results were obtained by **Azad and Hamid, (2000)** and **Parameshwarapp *et al*, (2005)**. It suggests high component of heritable portion of variation that can be exploited by breeders in the selection of superior genotypes on the basis of phenotypic performance. Maximum genetic advance was recorded for plant height (21.92%). Moderate amount of genetic advance was recorded for seed index (18.07%) and shelling (%) (12.67%). Whereas minimum genetic advance was recorded for pod yield/ plant (8.59%) followed by days to 50% flowering (7.24%). Similar results were reported by **Azad and Hamid, (2000)**. In the present study Plant height, Seed index, Pod yield/ plant and Days to 50% flowering showed high genetic advance along with high heritability, genotypic and phenotypic coefficients of variation which suggested that these characters can be considered as favorable attributes for the improvement through selection and this may be due to

additive gene action thus, could be improved upon by adapting selection without progeny testing.

Table 1: Analysis of Variance for 10 Quantitative Characters of Groundnut

S. No.	Characters	Mean sum of Squares		
		Replication (df = 2)	Treatments (df = 49)	Error (df = 98)
1	Plant height	0.64	342.26**	0.64
2	Primary branches per plant	1.39	2.05**	0.71
3	Days to 50% flowering	3.86	50.95**	4.11
4	Days to maturity	6.86	42.68**	9.78
5	Number of pods per plant	1.88	5.92**	0.90
6	Number of grains per pod	1.46	5.41**	1.77
7	Seed index	10.71	250.50**	5.08
8	Shelling percentage	0.90	147.99**	9.93
9	sound matured kernel	5.57	53.93**	8.32
10	Pod yield per plant	1.65	66.93**	4.19

** Significant at 1% level of significance

Table 2: Coefficient of Variation, Heritability and Genetic Advance for 10 Quantitative Characters of Groundnut

S. No.	Characters	Coefficient of Variation	Heritability (h^2) (%)	Genetic Advance (%)	Genetic Advance as % of Mean	
		Genotypic	Phenotypic			
1	Days to 50% flowering	12.99	14.61	79.0	7.24	23.86
2	Plant height	23.96	24.03	99.0	21.92	49.23
3	Number of primary branches	10.19	16.47	38.0	0.85	12.98
4	Days to maturity	2.86	3.93	52.0	4.95	4.28
5	pods/ plant	7.77	9.65	64.0	2.14	12.90
6	grains/ pod	9.42	14.78	40.0	1.44	12.38
7	Seed index	22.67	23.73	94.0	18.07	45.32
8	Shelling (%)	9.65	10.64	82.0	12.67	18.03
9	Sound matured kernel (%)	5.35	6.66	64.0	6.45	8.86
10	Pod yield/ plant	25.96	28.44	83.0	8.59	48.81

CONCLUSIONS

From the present investigation it is concluded that genotype ICG-10185 followed by ICG-10092 were found to be superior for pod yield. The considerable genetic variability was found among the 50 genotypes for all characters. High heritability coupled with high genetic advance for plant height, while moderate value of genetic advance was recorded for seed index and shelling (%).

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